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A cross-sectional study of effect of stress and anxiety on neck pain among undergraduate physiotherapy and nursing students of a rural health sciences University from Maharashtra, India

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ABSTRACT

Introduction: Neck Pain is one of the common public health problems all over the world. It has negative effect on health and quality of life. Neck Pain can be a leading cause of disability. Stress and anxiety may have effects on course and prognosis of neck pain. **Objective:** To investigate the effect of stress and anxiety on neck pain among physiotherapy and nursing students. **Methods:** 120 participants were included in the present study by using consecutive sampling method from physiotherapy and nursing colleges affiliated to Rural Health Sciences University from Maharashtra, India as per the inclusion and exclusion criteria after obtaining the written informed consents from all the participants. Perceived stress scale (PSS) – 10 item, and Zung's Self-rating Anxiety Scale (SAS) were used to assess stress and anxiety respectively among study participants. Numerical Pain Rating Scale was used to assess the neck pain among study participants. **Results:** Majority of participants was females (73.3%), belonged to age group of 17 to 20 years (82.5%) and physiotherapy course (61.7%). Prevalence of stress, anxiety, and neck pain were 84.2%, 53.3%, and 64.2% respectively. Female gender was associated with the higher severity of stress. Significant relationship exists between the severity of stress and presence of neck pain among study participants and such relationship was not evident between the severity of anxiety and neck pain. **Conclusion:** Findings of present study reflects an impact of stress on neck pain and stress management techniques can be used while managing the individuals with neck pain for better outcome.

Keywords: Anxiety, Neck pain, Nursing, Stress, Physiotherapy.

1. INTRODUCTION

Background

Neck pain is one of the most common public health issues across the globe. It affects the health as well as quality of life of the sufferers, with negative impact on the suffering individual, his family members, social economy and health systems (Liu et al., 2018; Hoy et al., 2014; Hurwitz et al., 2016; Vassilaki & Hurwitz, 2014). Annual prevalence of neck pain has exceeded 30% and it was the fourth leading cause of disability after ischemic heart disease (IHD), cerebrovascular disease (CVD), and lower respiratory tract infection (LRTI) (GBD, 2016; Hurwitz et al., 2018). Neck pain has a wide array of symptoms that may include pain related to neck, back and shoulders, weakness and stiffness of upper limbs along with numbness of fingers, nausea, vomiting, blurring of vision and dizziness (Su, 2016). As per the clinical symptoms, neck pain has been classified into the three types such as cervical radiculopathy, axial neck pain, and cervical myelopathy (Connell & Wiesel, 1992).

Studies have found that psychiatric disorders are linked to physical illness (Olver & Hopwood, 2013; Katon et al., 2007), which may hold true for neck pain also. Childhood psychological disorders can also lead to occurrence of chronic pain conditions during adulthood. Childhood psychological traumas include various types like physical abuse, physical neglect, emotional abuse, emotional neglect and sexual abuse (Ghogare et al., 2020; Ghogare et al., 2021a; Ghogare et al., 2021b). A study found that emotional neglect, physical neglect, emotional abuse and physical abuse were associated with both anxiety and long term pain. The same study concludes that childhood psychological traumas may predispose a person to the development of anxiety with comorbid chronic pain conditions during adulthood (Kascakova et al., 2020).

Ample of description is available regarding the link between anxiety/depressive symptoms and neck pain. However, different studies differ in the findings regarding such link (Dimitriadis et al., 2015; Kayhan et al., 2016). A study observed the neck pain prevalence of 51.8% among undergraduate physiotherapy students (Tanveer & Shahid, 2017). Another study observed the neck pain prevalence of 26.5% and 26.1% among undergraduate physiotherapy and nursing students respectively (Yu Chan et al., 2020). The prevalence of neck pain among undergraduate students from the neighbour of India i.e. from Pakistan was found to be 56.7% (Malik et al., 2017). Prevalence of neck pain across the globe ranges between 16.7% and 75.1% (Fejer et al., 2006).

Stress is defined as the internal state that may be the result of physical pressures on body (like diseases, extremes of temperature, exercise, etc.) or by social and environmental conditions that are considered as uncontrollable, potentially harmful or exceeding our resources of coping (Morgan et al., 1993). The environmental, physical, and social sources of the stress are known as stressors (Morgan et al., 1993). Any significant physical illness can also act as a stressor (Ghogare et al., 2021c; Sheikh et al., 2020). A study had observed that the prevalence of stress among the undergraduate physiotherapy students was 53.2% (Syed et al., 2018). An Indian study had observed that the prevalence of stress among the undergraduate nursing students from the government college and from private nursing were 60% and 62% respectively (Singh et al., 2018). A study had evaluated the relationship between work related stress and the neck pain amongst the nurses, and found that an incidence of new cases of neck pain was significantly higher amongst the group of nurses who were exposed to stress than the nurses who were not exposed to the stress ($p = 0.001$). The same study concluded that an incidence of neck pain was higher amongst the nursing staff with higher level of stress (Bahrami-Ahmadi et al., 2016).

Anxiety is diagnosed by the DSM- 5 (Diagnostic and Statistical Manual of mental disorders – fifth edition) diagnostic criteria as an excessive worry occurring on nearly every day for at least 6 months, about number of activities or events. Such a person finds it difficult to control the worry. Anxiety or worry is associated with 3 or more of the 6 symptoms such as feelings of restlessness or feelings of on edge or feelings of keyed up, easy fatigability, irritability, difficulty in concentration in work or mind going blank, muscular tension, and sleep disturbances in the form of struggling to fall or stay asleep, or the restless sleep or unsatisfying sleep (Kimmel & Byrne, 2017; American Psychiatric Association, 2013; Ghogare & Patil, 2020; Sinha et al., 2021; Ghogare et al., 2021d). The prevalence of anxiety among undergraduate physiotherapy and undergraduate nursing students were 68.54% (Syed et al., 2018) and 41.7% (Zeng et al., 2019). Few studies have concluded that anxiety acts a psychological etiological factor for the causation of neck pain (Kanchanomai et al., 2011; Razvi et al., 2018; Kalirathinam et al., 2017; Lee et al., 2018).

Rationale for the study

After reviewing the available literatures across various databases, we found that the detailed literature is not available in Indian research field regarding assessment and comparison of an impact of stress and anxiety on neck pain among the undergraduate students of physiotherapy and nursing faculties. By carrying out such in-depth research study, it will be easy in understanding as well as comparing the relationship between stress and neck pain, and anxiety and neck pain among undergraduate students.

Objective of the study

The primary objective of the present study was to assess the relationship between the psychological issues such as stress and anxiety, and the neck pain among undergraduate physiotherapy and nursing students of a rural health sciences university from Maharashtra, India.

Pre-specified hypothesis of the study

Based on the previous study findings (Bahrami-Ahmadi et al., 2016; Kanchanomai et al., 2011; Razvi et al., 2018; Kalirathinam et al., 2017; Lee et al., 2018), we hypothesized that individuals with significantly higher stress and anxiety will have higher rates of neck pain.

2. METHODOLOGY**Study design**

Present study was the cross-sectional research study.

Study setting, location, and relevant dates

Before conducting the present study, approval from institutional ethics committee was obtained. Present study was carried out by the department of Community Health Physiotherapy, department of Neuro-physiotherapy, department of Musculoskeletal Physiotherapy, and department of Psychiatry of a Rural Health Sciences University from Maharashtra, India. Study was conducted over a period of 7 months from August 2019 to February 2020, through a pre-designed questionnaire.

Eligibility criteria for the study participants, and the sources as well as methods of selection of the study participants

Eligibility/inclusion criteria adopted for the study were participants who consented for the participation in the present study; those belonged to undergraduate physiotherapy and nursing student categories, those who had proficiency in the English language. Exclusion criteria include exclusion of the students who didn't consented for the study participation, and the students other than either of the above mentioned categories of undergraduate students. The data were collected by using consecutive sampling method.

Data sources/ measurement

Present study was in English language. In the study, we have used three standardized and psychometrically sound scales namely: Perceives Stress Scale (PSS) – 10 item, Zung's Self-Rating Anxiety Scale (SAS), and Numerical Pain Rating Scale (NPRS). Perceived stress scale (PSS) – 10 item is one of the common instruments used to measure the perception and degree of stress. PSS measures the degree of stress. PSS was devised for the use in community sample with at least of educational level up to junior high school. PSS asks about the thoughts and feelings during the period of last month. PSS contains total 10 items, each of which is rated from 0 to 4 to yield a score range from 0 to 40. Scores of 0 to 13, 14 to 26, and 27 to 40 indicate low, moderate, and high perceived levels of stress respectively (Cohen et al., 1983). A research study consisting of review of 19 articles has shown that reliability, internal consistency, and hypothesis and factorial validities of PSS were well reported. The same study concluded that the psychometric properties of PSS-10 item were superior to both PSS-4 item and PSS-14 item scales, and recommended that PSS-10 item scale should be used commonly to measure the perceived stress both in research as well as in practice. The same review study also found that Cronbach's alpha of PSS-10 was $>.70$ in the twelve studies. Finally, the same study had also observed that the test-retest reliability of PSS-10 was measured in 4 studies, and met the criterion of $>.70$ in all those studies (Lee et al., 2012).

Zung's Self-Rating Anxiety Scale (SAS) is a self-administered instrument with 20-item, each of which being rated on the scale from 1 to 4 responses. The total score ranges from 20 to 80 (Zung, 1971). Scores of 20 to 44 are normal, while scores of 45 to 59, 60 to 74, and 75 to 80 indicate mild, moderate, severe, and extreme levels of anxiety respectively (Zung, 1971; Psychology.wikia, 2021). SAS has shown good internal consistency with a Cronbach's alpha value of .82 (Tanaka-Matsumi & Kameoka, 1986), and fair concurrent validity, correlating significantly (0.30) with Taylor Manifest anxiety scale (Zung, 1971).

The Numerical Pain Rating Scale (NPRS) is an 11-point rating scale devised to measure the pain intensity (Childs, 2005; Jensen & McFarland, 1993). This 11-point scale ranges from '0' which signifies "no pain" to '10' which signifies "extreme degree of the pain" (Jensen & McFarland, 1993; Rodriguez, 2001). A score of 0, 1 to 3, 4 to 6, and 7 to 10 indicate absence of neck pain, mild, moderate, and severe neck pain respectively (Snyder & Dawn, 1992). NPRS is easy to administer and takes less than 1 minute to complete

(Ferraz et al., 1990; Jensen et al., 1989). NPRS is reliable and valid tool to assess an intensity of pain (Hawker, 2011). NPRS has shown high test-retest reliability amongst both literate as well as illiterate patients suffering from chronic pain condition like rheumatoid arthritis ($r = 0.96$ and 0.95 , respectively) prior to and after the medical treatment (Ferraz et al., 1990). As regards the construct validity, NPRS was observed to be greatly correlated with the visual analogue scale (VAS) among patients with rheumatoid arthritis and other chronic pain conditions (i.e. conditions in which pain lasts for more than 6 months) and the correlation was in range from 0.86 to 0.95 (Ferraz et al., 1990).

Bias

Present study was voluntary as well as open research survey. None of the participants were provided any form of incentives for participating and completing the survey questionnaire of the present study. All the participants were allowed to fill in the responses from the pre-designed questionnaire only once by providing only the single pro-forma containing socio-demographic questions and items/questions from above mentioned 3 scales i.e. none were able to participate and solve the questionnaire twice, thus preventing the duplication of responses.

Study size

Sample/ study size for this cross-sectional study was calculated with the help of a formula used for the cross-sectional study design ($n = 4pq/L^2$), in which “p” is prevalence of neck pain in study participants, “q” = $100 - p$, “L” is an allowable error which is 20% of the “p” (Ghogare & Patil, 2020). By considering the findings of the past studies (Malik et al., 2017; Fejer et al., 2006), at “p” = 45.5%, the sample size required was 119.78, which was rounded and finalized as 120.

Statistical methods

Data from all the three scales mentioned above were stored in the 2010 version of Microsoft Excel. Final data were analysed by using the version 15 of the SPSS software for the statistical analysis. The continuous data were presented in the form of mean and standard deviation (SD), while categorical data were presented as the frequency and percentage. The level of significance was measured by using Chi-square and Fisher’s exact tests. To test the correlation between presence of stress/anxiety and presence of neck pain, Pearson’s test of correlation was applied. The significance level was set at ≤ 0.05 .

3. RESULTS

Distribution of socio-demographic factors

Table 1 shows that most of the students were from 17 to 20 years of age group (82.5%), female gender (73.3%), and Physiotherapy undergraduate course (61.7%).

Table 1 Distribution of socio-demographic factors among study participants (n=120)

Socio-demographic factors	n (%)
Age group (in years)*	
17 to 20	99 (82.5)
21 to 23	21 (17.5)
Gender	
Male	32 (26.7)
Female	88 (73.3)
Academic course	
Physiotherapy	74 (61.7)
Nursing	46 (38.3)

*Mean age \pm SD (Range) = 19.19 ± 1.32 (17–23)

Distribution of severity of stress, anxiety, and neck pain

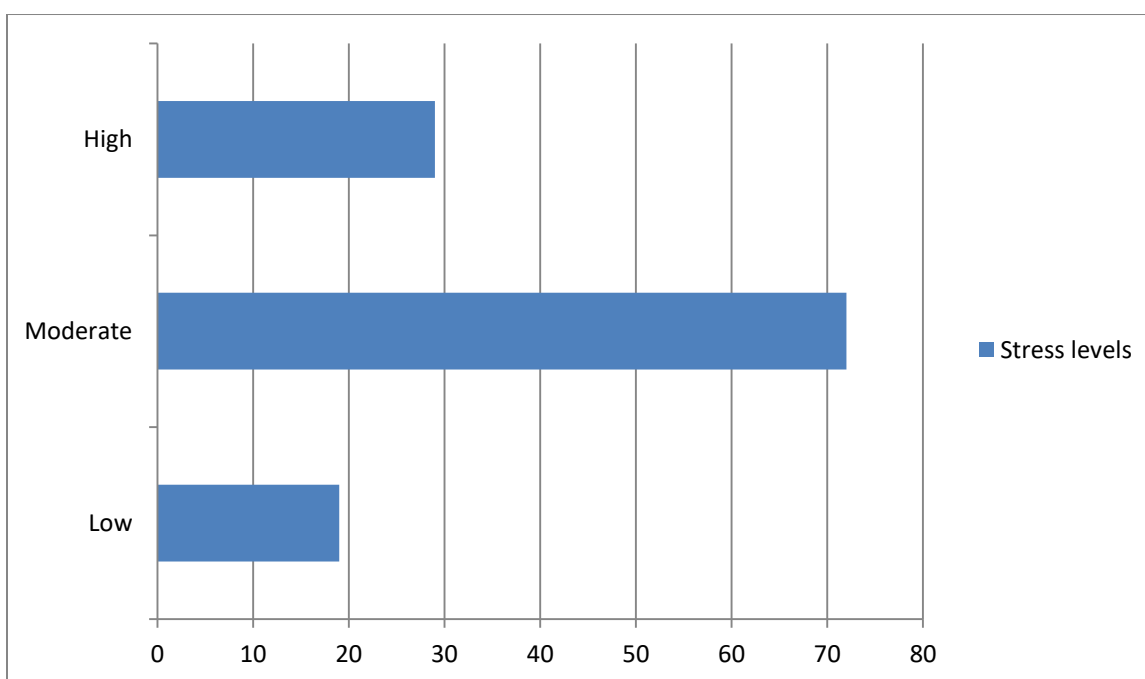
Table 2 and figure 1, 2, and 3 show that the prevalence of stress, anxiety, and neck pain in the students were 84.2%, 53.3%, and 64.2% respectively.

Table 2 Distribution of severity of Stress, Anxiety, and Neck Pain among study participants (n = 120)

Distribution of severity of stress, anxiety and neck pain	n (%)
Stress*	
Low	19 (15.8)
Moderate	72 (60.0)
High	29 (24.2)
Anxiety [†]	
No	56 (46.7)
Mild	54 (45.0)
Moderate	10 (8.3)
Severe	0
Neck pain [‡]	
No	43 (35.8)
Mild	29 (24.2)
Moderate	41 (34.2)
Severe	7 (5.8)

* Mean age \pm SD (Range) = 20.26 \pm 6.91 (4 – 39). [†] Mean age \pm SD (Range) = 45.70 \pm 5.85 (35 – 65).

[‡] Mean age \pm SD (Range) = 2.77 \pm 2.53 (0 – 9).

**Figure 1** Bar chart showing the distribution of stress levels among study participants

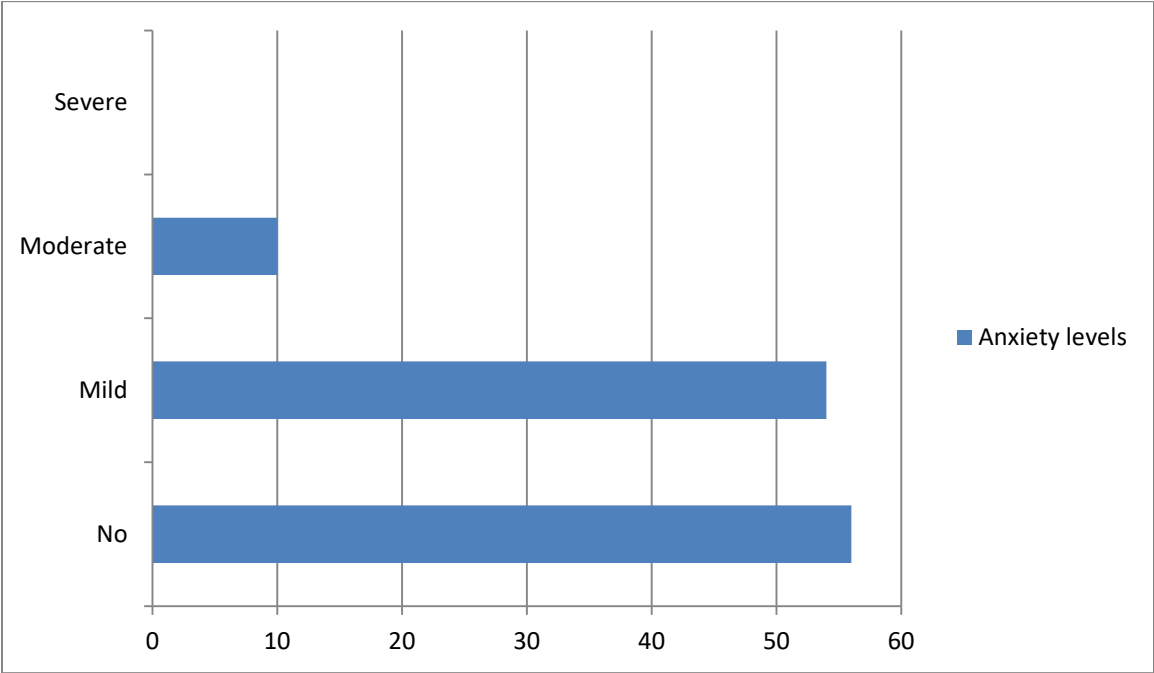


Figure 2 Bar chart showing the distribution anxiety levels among study participants

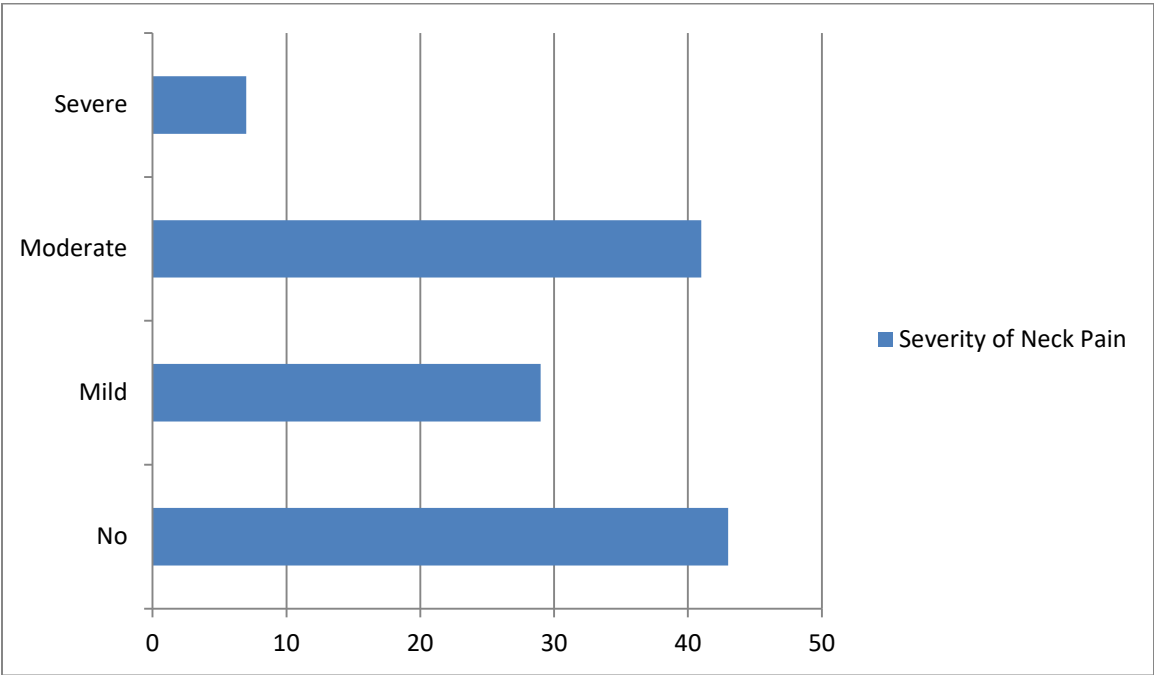


Figure 3 Bar chart showing the distribution severity of neck pain among study participants

Association between stress and socio-demographic factors

Table 3 shows that among the socio-demographic factors, presence of significant stress was associated with only the female gender.

Table 3 Association between stress and socio-demographic factors among study participants (n = 120)

Socio-demographic factors	Stress		P value
	Significant (n1 = 101)	Low/absent (n2 = 19)	
Age group (in years)			0.38
17 to 20	82 (81.2)	17 (89.5)	
21 to 23	19 (18.8)	2 (10.5)	

Gender			
Male	23 (22.8)	9 (47.4)	0.02
Female	78 (77.2)	10 (52.6)	
Academic course			
Physiotherapy	62 (61.4)	12 (63.2)	0.88
Nursing	39 (38.6)	7 (36.8)	

Association between anxiety and socio-demographic factors

Table 4 shows that among the socio-demographic factors, presence of anxiety was not associated with any of the socio-demographic factors.

Table 4 Association between anxiety and socio-demographic data among study participants (n = 120)

Socio-demographic factors	Anxiety		P value
	Present (n ₁ = 64)	Absent (n ₂ = 56)	
Age group (in years)			0.17
17 to 20	50 (78.1)	49 (87.5)	
21 to 23	14 (21.9)	7 (12.5)	
Gender			0.69
Male	18 (28.1)	14 (25.0)	
Female	46 (71.9)	42 (75.0)	
Academic course			0.86
Physiotherapy	39 (60.9)	35 (62.5)	
Nursing	25 (39.1)	21 (37.5)	

Association between the neck pain and the socio-demographic factors

Table 5 shows that among the socio-demographic factors, presence of the neck pain was not associated with any of the socio-demographic factors.

Table 5 Association between the neck pain and the socio-demographic factors among study participants (n = 120)

Socio-demographic factors	Neck pain		P value
	Present (n ₁ = 77)	Absent (n ₂ = 43)	
Age group (in years)			0.20
17 to 20	61 (79.2)	38 (88.4)	
21 to 23	16 (20.8)	5 (11.6)	
Gender			0.27
Male	18 (23.4)	14 (32.5)	
Female	59 (76.6)	29 (67.5)	
Academic course			0.84
Physiotherapy	47 (61.0)	27 (62.8)	
Nursing	30 (39.0)	16 (37.2)	

Association between stress, anxiety, and neck pain

Table 6 shows that the presence of severe or high perceived stress was associated with the neck pain among study participants.

Table 6 Association between stress, anxiety, and neck pain among study participants (n = 120)

Stress and Anxiety	Neck pain		P value
	Present (n ₁ = 77)	Absent (n ₂ = 43)	
Stress			0.01
Low	12 (15.6)	7 (16.3)	
Moderate	40 (51.9)	32 (74.4)	
High perceived	25 (32.5)	4 (9.3)	0.53
Anxiety			
No	33 (42.8)	23 (53.5)	
Mild	37 (48.1)	17 (39.5)	
Moderate	7 (9.1)	3 (7.0)	

4. DISCUSSION

The long term or chronic neck pain can have profound mental health impact on the sufferers in the form of stress and anxiety, which can cause a significant impairment in quality of life.

Relationship between the Stress and Neck Pain

Stress and neck pain are the conditions which occur commonly across the globe. In current study, prevalence of stress among the undergraduate study participants was 84.2%, out of which 60.0% had moderate, and 24.2% had severe stress as measured by the PSS-10 scale. A study from Pakistan had found that the prevalence of stress was 53.2% among undergraduate physiotherapy students (Syed et al., 2018). An Indian study had compared the prevalence of stress amongst the undergraduate nursing students working in government hospital and in private nursing hospital, which were 60% and 62% respectively (Singh et al., 2018).

In the present study, presence of severe or high perceived stress was associated with the neck pain amongst undergraduate physiotherapy and nursing students ($p = 0.01$), thus proving the hypothesis of the present study that the significant relationship exist between severity of stress and presence of neck pain. A study from Iran had found that the rate of neck pain was greater amongst the nurses who had greater stress level (Bahrami-Ahmadi et al., 2016). These findings suggest that the burden of neck pain increases among the individuals who have comorbid stress. Bruflat et al., (2012) observed that combined treatment involving the physical therapy and stress management exercises led to muscle relaxation which in turn reduced the disability associated with neck pain.

Relationship between Anxiety and Neck Pain

In the current study, prevalence of anxiety was 53.3%, out of which 45.0% had mild anxiety and 8.3% had moderate anxiety. None of the present study participant had severe neck pain. Two different studies observed that the prevalence of anxiety among undergraduate physiotherapy and nursing students was 68.54% (Syed et al., 2018), and 41.7% (Zeng et al., 2019) respectively. In the present study, presence of anxiety levels was not associated with the neck pain. In contrast to present study, a study from China had shown that comorbid anxiety symptoms were higher amongst the patients with neck pain, thus confirming an effect of anxiety on neck pain (Liu et al., 2018). Huang et al., (2013) had observed that the incidence of anxiety amongst the study participants was 60.53%.

Two studies have reported a similar finding that comorbid anxiety affects the quality of life among the persons suffering from musculoskeletal pain which may also hold true in the case of neck pain, thus increasing the burden of disease among the sufferers (Galbusera et al., 2014; Gorter, 1976). These findings suggest that the burden of neck pain increases among the individuals who have comorbid anxiety. Treatment of comorbid anxiety may prove beneficial among the persons with neck pain.

Limitations

Present study consists of a few limitations. First, as this study was conducted on a specific population who were the undergraduate students of physiotherapy and nursing health sciences academic courses, the limitation of generalizability of the results exists. Second limitation is that although study participants answered self-administered questionnaires based on their actual perception, an exaggeration, or an overestimation might exist.

5. CONCLUSION

In the present study, significant relationship was found between the severity of stress level and presence of neck pain. Hence, such finding warrants the inclusion of stress management strategies while treating the persons with neck pain. Future clinical research trials must assess the role of stress management as an adjunct therapy for persons with chronic neck pain who tend to have increased muscle activity secondary to psychosocial stress. Also, future research must focus on assessing the causality as well as direction of the association between psychosocial distress like stress and anxiety, and neck pain, apart from determination of benefits of psychosocial interventions.

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Author Contributions

1. Shrutika H Wankhade: Concepts, Design, Definition of intellectual content, Literature search, Data acquisition, Data analysis, Manuscript editing, Manuscript review, Guarantor.
2. Ashish Wasudeorao Bele: Concepts, Design, Definition of intellectual content, Literature search, Data acquisition, Data analysis, Manuscript editing, Manuscript review, Guarantor.
3. Divya Jain: Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript editing, Manuscript review, Guarantor.
4. Ajinkya Sureshrao Ghogare: Literature search, Data analysis, Statistical analysis, Manuscript editing, Manuscript review, Guarantor.
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6. Pratik Phansopkar: Literature search, Data analysis, Statistical analysis, Manuscript editing, Manuscript review, Guarantor.
7. Nivedita Chandrapal Singh: Literature search, Data analysis, Statistical analysis, Manuscript editing, Manuscript review, Guarantor.

Research quality and ethics statement

The authors of this study declare that this scientific work complies with reporting quality, formatting and reproducibility guidelines set forth by the EQUATOR Network. The authors also attest that this clinical investigation study was approved by the institutional ethics committee (IEC) and the corresponding approval number is – (IEC/2019-20/0017, dated April 22, 2019).

Conflicts of interest

The authors declare that they have no conflict of interest.

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Data and materials availability

All data associated with this study are present in the paper.

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